Idaho National Engineering & Environmental Laboratory
Bechtel BWXT Idaho LLC.

PORTABLE HF GAS MONITOR

Summary:

The Portable Hydrogen Fluoride Gas Monitor was deployed as part of the HF cylinder removal project at INTEC. The monitor assisted project personnel with determining the condition of the HF cylinders during excavation, removal and disposal. Deployment of the monitor did produced substantial cost savings. However, the primary function of the monitor was to reduce the risk to workers involved with excavation and handling of the cylinders. The monitor provided constant air monitoring of the work area.

The monitor employs a chemical sensor membrane to detect the presence of HF gas. The cost to utilize the monitor was minimal at $1,500. The alternative cost/cost avoidance using calumetric air sampling at once per hour for 160 hours calculates out as follows. Full time IH support ($70/hr X 160 hrs =$11,200) + (PPE $2,000) + (calumetric tubes $300) = $13,500 ($13,500) –($1500) = **$12,000 cost savings**

This deployment does not address a technology need.

Qualitative Benefit Analysis		
Programmatic Risk	◒	Risk to the ER program was reduced slightly via the use of the HF Gas Monitor for the HF cylinder removal project.
Technical Adequacy	●	The HF monitor provided a far superior safety envelope than other options. The superior results were produced by using constant monitoring. The alternative was periodic calumetric air sampling.
Safety	●	The Portable HF Gas Monitor allowed for the safe removal of Hydrogen Fluoride cylinder since worker risk was greatly reduced. Data from the monitor indicated that no HF gas was leaking from the cylinders thereby reducing or eliminating the release of toxic gasses and increasing confidence in completing the task without injury.

Schedule Impact	◒ On-site HF gas monitoring of the cylinder avoided delays that would have occurred if samples had to be collected and analyzed at an off-site lab.

●	◒	○	◓	◉
Major Improvement	Some Improvement	No Change	Somewhat Worse	Major Decline

Quantitative Benefit Analysis	
Cost Impact Analysis	Cost avoidance was achieved by not having to not having to plan for and implement a remotely affected cylinder removal. The cost to utilize the monitor was minimal at $1,500. The alternative cost/cost avoidance using calumetric air sampling at once per hour for 160 hours calculates out as follows. Full time IH support ($70/hr X 160 hrs =$11,200) + (PPE $2,000) + (calumetric tubes $300) = $13,500 ($13,500) –($1500) = **$12,000 cost savings** Annual Savings $12,000 Life Cycle Cost Savings $12,000 Return-On-Investment (ROI) 800 %

Worksheet 1: Operating & Maintenance Annual Recurring Costs

Expense Cost Items *	Before (B) Annual Costs	After (A) Annual Costs
1. Equipment	$ 300.00	$ -
2. Purchased Raw Materials and Supplies	$ -	$ -
3. Process Operation Costs:		
Utility Costs	$ -	$ -
Labor Costs	$ 11,200.00	$ -
Routine Maintenance Costs for Processes	$ -	$ -
Subtotal	$ 11,200.00	$ -
4. PPE and Related Health/Safety/Supply Costs	$ 2,000.00	$ -
5. Waste Management Costs:		
Waste Container Costs	$ -	$ -
Treatment/Storage/Disposal Costs	$ -	$ -
Inspection/Compliance Costs	$ -	$ -
Subtotal	$ -	$ -
6. Recycling Costs		
Material Collection/Separation/Preparation Costs:		
a) Material and Supply Costs	$ -	$ -
b) Operations and Maintenance Labor Costs	$ -	$ -
Vendor Costs for Recycling	$ -	$ -
Subtotal	$ -	$ -
7. Administrative/other Costs (planner)	$ -	$ -
Total Annual Cost:	$ 13,500.00	$ -

* See attached Supporting Data and Calculations.

Worksheet 2: Itemized Project Funding Requirements*
(i.e., One Time Implementation Costs)

Category	Cost $
INITIAL CAPITAL INVESTMENT	
1. Design	$ -
2. Purchase	$ 1,500
3. Installation	$ -
4. Other Capital Investment (explain)	$ -
Subtotal: Capital Investment= (C)	$ 1,500
INSTALLATION OPERATING EXPENSES	
1. Planning/Procedure Development	$ -
2. Training	$ -
3. Miscellaneous Supplies	$ -
4. Startup/testing	$ -
5. Readiness Reviews/Management Assessment/Administrative Costs	$ -
6. Other Installation Operating Expenses (explain)	$ -
Subtotal: Installation Operating Expense = (E)	$ -
7. All company adders (G & A/PHMC Fee, MPR, GFS, Overhead, taxes, etc.)(if not contained in above items)	$ -
Total Project Funding Requirements=(C + E)	$ 1,500
Useful Project Life = (L) 1 Years Time to Implement: 0 Months	
Estimated Project Termination/Disassembly Cost (if applicable) = (D)	$ -
(Only for Projects where L<5 years; D=0 if L>5 years)	

TOTAL LIFE-CYCLE COST SAVINGS CALCULATION FOR IPABS-IS

(Before - After) x (Useful Life) - (Total Project Funding Requirements + Termination)

Total Life Cycle Cost Savings Estimate = (B - A) x L - (C+E+D) $12,000

RETURN ON INVESTMENT CALCULATION

Return on Investment (ROI) % =

$$\frac{\textit{(Before - After) - [(Total Project Funding Requirements + Termination)/Useful Life]}}{\textit{[Total Project Funding Requirements + Project Termination]}} \times 100$$

$$ROI = \frac{(B-A)-[(C+E+D)/L}{(C+E+D)} \times 100 \quad 800 \quad \%$$

O&M Annual Recurring Costs:				Project Funding Requirements:			
Annual Costs, Before=	$ 13,500	(B)		Capital Investment=	$ 1,500	(C)	
Annual Costs, After=	$ -	(A)		Installation Op. Exp=	$ -	(E)	
Net Annual Savings=	$ 13,500	(B-A)		Total Project Funds=	$ 1,500	(C+E)	

Note: Before (B) and After (A) are Operating & Maintenance Annual Recurring Costs from Worksheet 1.

Basis for Estimates

1	Equipment
	Equipment costs associated with the alternative method to the HF gas sampler involves the purchase of calumetric tubes at $300.

2	Purchased Raw Materials and Supplies

3	Process Operation Costs:
	Utility Costs **Labor Costs** The alternative to the HF gas analyzer would have been using calumetric air sampling. The labor costs associated with using calumetric air sampling at once per hour for 160 hours calculates out as follows. Full time IH support ($70/hr X 160 hrs =$11,200). **Routine Maintenance Costs for Processes**

4	PPE Costs
	The cost for PPE to conduct calumetric air sampling is approxiamately $2,000.

Summary
The total cost to have used calumetric air sampling would have been $13,500. The cost to run the HF gas monitor was $1,500, therefor the project was able to avoid $12,000 in costs.

SCIENCE AND TECHNOLOGY BENEFIT ANALYSIS DEPLOYMENT APPROVALS

Technology Deployed: PORTABLE HYDROGEN FLUORIDE GAS MONITOR

Date Deployed: 12/01/00

EM Program(s) Impacted: Environmental Restoration Program

Approval Signatures

Lee Slade — 8/21/01

Contractor Program Manager — Date

N/A

Contractor Program Manager — Date

Kathleen E. Hain — 8/23/01

DOE-ID Program Manager — Date

N/A

DOE-ID Program Manager — Date